

CLAIMS:

1. A flexible semiconductor device comprising:
 - a semiconductor substrate, which laterally extends in an active area;
 - an integrated circuit provided with a plurality of semiconductor elements, that are defined at a surface of the semiconductor substrate, that is present in a suitable thickness5 so as to be flexible, and which elements are interconnected according to a desired pattern in an interconnect structure,
 - a support layer of electrically insulating material, and
 - an antenna, which is defined laterally outside the active area in an electrically conductive layer adjacent to the support layer and is electrically connected to the interconnect10 structure, the semiconductor substrate being absent in a non-substrate area between the antenna and the integrated circuit, characterized in that at least one conductor from the interconnect structure extends laterally to the antenna so as to constitute the electrical interconnection.
- 15 2. A flexible semiconductor device as claimed in Claim 1, wherein the integrated circuit is devoid of any bond pad structures.
3. A flexible semiconductor device as claimed in Claim 1, wherein:
 - the integrated circuit is provided with a passivation, the interconnect structure20 being sandwiched between the passivation and the semiconductor substrate, and
 - the support layer is part of the passivation of the integrated circuit.
4. A flexible device as claimed in claim 1, characterized in that the active area of the substrate is in the shape of a mesa.
- 25 5. A flexible device as claimed in claim 1 or 2, characterized in that the semiconductor substrate is present only in the active area.

6. A flexible device as claimed in claim 1, characterized in that the antenna is an inductor suitable for wireless communication.

7. A flexible device as claimed in claim 6, wherein the integrated circuit is 5 laterally located within the inductor.

8. A flexible device as claimed in claim 7, wherein the integrated circuit is subdivided into a plurality of circuit blocks, which are mutually spaced apart, but interconnected through the interconnect structure.

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9. A device as claimed in claim 8, wherein the device comprises active areas corresponding to the circuit blocks, and a non-substrate area is defined laterally between the active areas and around these areas, the semiconductor substrate being absent in said non-substrate area.

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10. A device as claimed in claim 6, characterized in that a perpendicular projection of the integrated circuit onto the electrically conductive layer of the antenna at least substantially overlaps with the antenna.

20 11. A security paper comprising the flexible semiconductor device as claimed in any of claims 1 to 10.

12. An identification label comprising a carrier and the flexible semiconductor device according to any of claims 1-10.

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13. An identification label as claimed in claim 12, further comprising conducting elements in order to improve wireless energy transmission.

30 14. An identification label as claimed in claim 12 or 13, in which the carrier comprises security paper, which paper encapsulates the flexible device.

15. An identification label as claimed in claim 14, that is suitable for banknote or security paper.

16. An identification document comprising the security paper according to claim 11.

17. An apparatus comprising a flexible semiconductor device as claimed in any of 5 claims 1-10 or an identification label as claimed in claim 12, 13 or 14.

18. A method of communication between a reader and at least one flexible semiconductor device according to any of claims 1-10, comprising the steps of 10

- providing a first signal from the reader to the antenna of the flexible device;
- reading at least part of the memory of the flexible device using energy and information in the first signal, thereby supplying a second signal, and
- transmitting the second signal from the flexible device to the reader.

19. A method as claimed in claim 18, wherein the second signal is compared by 15 the reader to check the identity or verify the authenticity of the label, document or apparatus of which the flexible device is part.

20. A method of manufacturing a flexible semiconductor device comprising the steps of:

- providing a body with at least one integrated circuit having a plurality of semiconductor elements, that are defined at a surface of the semiconductor substrate, and which elements are interconnected according to a desired pattern in an interconnect structure, which interconnect structure is provided with a passivation;
- attaching a temporary carrier to the passivation of the body;
- removing the semiconductor substrate at least partially, and
- removing the temporary carrier so as to obtain the flexible semiconductor device,

characterized in that

- the interconnect structure extends with a first conductor to an antenna that is 30 defined laterally displaced from the integrated circuit, which antenna is covered by the passivation; and
- the substrate is removed completely in a non-substrate area between the antenna and the integrated circuit.